

PULP & PAPER



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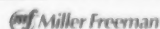
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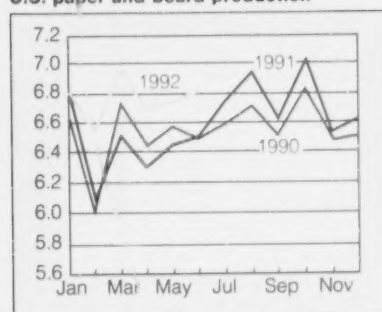


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MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.8 million tons in May, up 5.6% from the same month last year, according to the American Paper Institute. Production rebounded from a drop-off in May despite continued weakness in the economy. The seasonally adjusted production rate stood at 41.8 million tpy for paperboard, up 5.7% from a year earlier, and 39.4 million tpy for paper, up 1.5%. Most of the improvement was in the paper grades, which suffered a weak first quarter.

Among major grades, printing and writing paper shipments were up 2.0% from year-earlier levels through the first half, led by a gain of 8.5% for coated free-sheet and 3.5% for uncoated free-sheet. Newsprint production remained strong, posting a 3.7% increase over last year. Containerboard production for domestic use was up 8.6% through the first half, but production for the export market registered a gain of just 0.4%.

Canadian newsprint shipments totaled 766,000 metric tons in June, up 4.8% from a year earlier, according to the Canadian Pulp & Paper Assn. Operating rates fell to 84%. Woodpulp mills operated at just 71% due to the month-long strike in British Columbia, while shipments dropped 4.3% to 688,000 tons.

	Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
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PAPER & PAPERBOARD PRODUCTION¹

Newsprint	June	572	2.3	7,014	3.7
Uncoated groundwood (s)	June	123	-15.2	1,504	-9.5
Coated paper (s)	June	655	9.9	7,306	2.6
Uncoated free-sheet (s)	June	957	3.8	11,442	3.5
Other printing/writing	June	128	11.3	1,491	-1.3
Total packaging and other paper (s)	June	385	5.2	4,580	2.4
Tissue	June	470	-0.8	5,732	-0.2
Total paper	June	3,291	3.6	39,169	2.0
Unbleached kraft paperboard	June	1,845	10.1	21,792	7.8
Semichemical medium	June	507	8.6	5,990	6.2
Bleached paperboard	June	376	-1.1	4,518	-1.8
Recycled paperboard	June	803	5.2	9,624	7.2
Total paperboard	June	3,531	7.5	41,923	6.3

Total U.S. paper and paperboard output	June	6,822	5.6	81,093	4.2
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PULP, WASTEPAPER & FIBER²

Total U.S. woodpulp production	June	5,420	4.3	65,380	3.5
Market pulp production	June	846	13.6	10,035	11.6
Wastepaper consumption at paper/board mills	June	2,095	16.4	24,457	10.9
Pulpwood consumption (cords)	May	8,693	7.2	100,394	0.9

CONVERTED PRODUCTS STATISTICS³

Corrugated box shipments (billion ft ²)	June	28,368	10.3	166,606*	6.3
Containerboard inventories at U.S. box plants and mills	June 30	2,607	-0.4		

INTERNATIONAL TRADE²

U.S. paper imports (including products)	May	1,060	5.2	11,794	-3.8
Imports of Canadian newsprint	May	642	-0.9	6,881*	-11.1
U.S. paper exports (including products)	May	767	9.9	8,895	9.2
Exports of unbleached kraft linerboard	May	274	5.4	3,180	3.8
Exports of woodpulp	June	630	9.9	7,344	13.4
Norscan pulp inventories*	June 30	1,110	-31.7		
Norscan pulp operating rates*	June	82%	86%	92%	90%

CANADIAN STATISTICS⁵ (reported in metric tons)

Total newsprint shipments	June	766	4.8	4,378*	-0.6
Operating rates	June	84%	87%	86%	90%
Inventories held by U.S. consumers	June 30	N.A.			
Other paper/board shipments	June	633	3.4	3,800	4.2
Woodpulp shipments (export only)	June	688	-4.3	4,552	9.0
Operating rates	June	71%	90%	86%	90%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Corrugating medium: Production to push capacity limits with any sustained pickup in demand

Grade structure: Corrugating medium, the middle fluting material used in corrugated containers, is made from both semichemical pulp and recycled fiber. Semichemical medium may not contain less than 75% virgin woodpulp (mainly semichemical). The share of total medium capacity held by semichemical has declined to about 73% in 1992 from 79% in 1980, while recycled has grown to 27%. Basis weights for corrugating medium are 22, 26, 33, 36, and 40 lb/1,000 ft². Standard sheet weight is 26 lb, which accounts for about 77% of production, although heavier weights have been growing in popularity.

Production/capacity: The corrugating medium market has been tightening, with stronger demand and almost no growth in new capacity. The result is that operating rates for corrugating medium should be among the highest for any grade of paper and paperboard. U.S. corrugated box shipments this year are forecast to increase about 2.9% following only 0.6% growth in 1991. Corrugating medium production (semichemical and recycled) was up about 6.6% through the first half from a year earlier, according to the American Paper Institute. Production was helped by about a 170,000-ton rise in medium inventories at box plants and mills (through July) from below normal levels at the end of 1991.

Medium production for the remainder of the year is expected to be relatively flat due to inventory reduction and more difficult year-ago comparisons with a stronger second half of 1991. For all of 1992, production is expected to increase about 3.8% from a year ago to a new record of 7.94 million tons. Operating rates for semichemical medium are expected to average almost 98%, while rates for recycled medium mills improve to 91% in 1992.

Outlook: With further gradual strengthening in the economy, U.S. corrugated box shipments are ex-

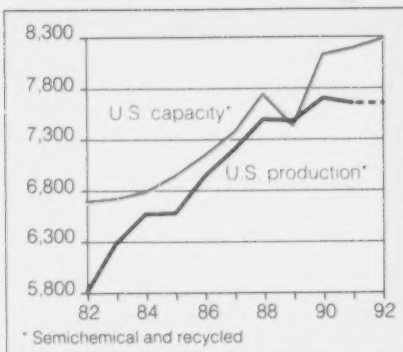
pected to show about 3.3% growth in 1993. Corrugating medium production is expected to rise 3.0% to 8.18 million tons, reflecting some further inventory reduction. However, capacity for corrugating medium is expected to rise only about 0.4% in 1993, with most of the growth in recycled board. As a result, operating rates for semichemical medium are expected to be around 99%, while rates for recycled medium reach 95%.

The only new semichemical medium capacity is from machine rebuilds that have recently been completed at Menasha Corp., Willamette Industries Inc., and Weston Paper & Manufacturing Co. Recycled medium will show somewhat stronger growth with additional capacity from Temple-Inland Inc.'s new containerboard mill at Maysville, Ky., scheduled to start up this fall, and Interstate Resources Inc.'s new 170-tpd mini-machine at Reading, Pa., scheduled to come online in late 1993. The supply squeeze may be eased by recycled machines swinging production from other grades and reactivation of idle machines.

Prices: Producers have begun to raise prices on corrugating medium and narrow an unusually large gap that developed with linerboard prices. After reaching a peak of close to \$400/ton in the second quarter of 1988, prices for semichemical medium began to erode and bottomed around \$280-290 by mid-1991. Producers pushed through a \$30/ton price increase in the fall of 1991 but have announced a \$40-50/ton price increase for the fall of 1992 after an unsuccessful attempt to raise prices last spring.

Year-end transaction prices for semichemical medium in the eastern U.S. are as follows: 1988, \$380-390; 1990, \$300-320; 1991, \$310-320. (See *P&P Factbook* for complete price histories.) Prices are higher on the West Coast where supply has been the tightest.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1991	1992e	1993e
Production			
Semichemical	5,711	5,890	6,030
Recycled	1,938	2,050	2,150
Total	7,649	7,940	8,180
Capacity ¹			
Semichemical	5,957	6,025	6,069
Recycled	2,227	2,251	2,263
Total	8,184	8,276	8,332
Utilization rate			
Semichemical	95.9	97.8	99.4
Recycled	87.0	91.1	95.0
Imports	100	135	140
Exports	170	180	180
Apparent U.S. consumption	7,579	7,895	8,140
lb/capita	55.7	56.9	58.9
GNP ratio ²	1.59	1.60	1.62

1. American Paper Institute capacity survey (1991)

2. 1,000 tons/\$ billion real GNP e = Pulp & Paper estimate

TOP U.S. PRODUCERS (000 tpy)

	Semi-chem	Recycled medium	Total	Market share (%)
1. Stone Container Corp.	695	235	930	1.2
2. Georgia-Pacific Corp.	845	—	845	10.2
3. Packaging Corp. of America	750	70	820	9.9
4. Weyerhaeuser Paper Corp.	730	—	730	8.8
5. Inland Container Corp.	245	430	675	8.2
6. Jefferson Smurfit Corp.	115	390	505	6.1
7. Mead Corp.	385	—	385	4.7
8. International Paper Co.	360	—	360	4.3
9. Willamette Industries Inc.	185	175	360	4.3
10. Virginia Fibre Corp.	285	—	285	3.4

Market share of top five companies:

48.3%

Market share of top ten companies:

71.2%

U.S. medium capacity (1992):

8,276 million short tons

(semichemical and recycled)

1. Includes G-P's 50% interest in a 170,000-tpy machine at Sonoco Products Co.'s Hartsville, S.C., mill.

MARKET PULP

Weyco to buy two P&G pulp mills

In a move that would clearly make it the world's largest market pulp producer, Weyerhaeuser Co. signed an agreement in mid-August to buy two market pulp mills, three sawmills, and about 175,000 acres of timberland from Procter & Gamble Co. The \$600-million deal includes a fluff pulp mill in Oglethorpe, Ga., a softwood kraft pulp mill in Grande Prairie, Alta., sawmills in both Grande Prairie and Grande Cache, Alta., and Barnesville, Ga., and forestland in Georgia. These were among the pulp-related assets P&G put up for sale last March (P&P, May 1992, p. 25).

The sale is contingent upon the transfer of a forest management license for 2.8 million acres of Alberta timberland, among other "standard conditions," and is expected to close by the end of the year. About 1,500 P&G employees will be affected, but they will all be offered continued employment. Weyco reportedly will finance the acquisition with internal funds and the issuance of commercial paper.

Jack Creighton, Weyco president and CEO, said, "This is the first major strategic opportunity since our refocusing effort and one of the largest in our history... It is a significant step toward improving our ability to be the best forest products company in the world." He said that the purchase would "provide immediate earnings and cash flow and long-term benefits to Weyerhaeuser."

Analysts estimate Weyco's earnings will rise nearly 10% in 1993 as a result of the transfer, though P&G reportedly indicated its own earnings would not be materially affected.

The acquisition will make Weyerhaeuser the world's largest market pulp producer, especially in fluff pulp, with an estimated market pulp capacity of 1.5 million metric tpy. (Georgia-Pacific Corp. has been neck and neck with Weyco in market pulp capacity since its purchase of Brunswick Pulp & Paper Co. in 1988.) A Weyco spokesman said production at Oglethorpe (also known as Flint River) was around 300,000 tpy in 1991, and Grande Prairie was approximately 280,000 tpy. Adding these facilities will raise Weyco's market pulp capac-

ity to about 2.1 million tpy. A second spokesman said another benefit of the transaction is that the firm "gets top-performing facilities without increasing world capacity." He added that Oglethorpe went online in 1981 and Grande Prairie in 1973.

Weyco said that P&G will "remain a customer" for the Oglethorpe and Grande Prairie mills. P&G will buy all

of Oglethorpe's pulp at market price and half of the Grande Prairie mill's output. Oglethorpe's fluff pulp is used to make diapers, and Grande Prairie's kraft pulp goes into tissue, towel, and paper products. The former head of P&G's pulp division was leading a leveraged buy-out attempt for P&G's two remaining pulp mills and related timberland. ■

Temple-Inland sets \$500-million project

The board of directors of Temple-Inland Inc. has approved a \$500-million expansion and modernization project at the company's bleached pulp and paperboard mill in Evadale, Texas. The series of capital projects includes the addition of a fifth paper machine, the construction of a new softwood pulp line, and the upgrade of the mill's three existing fourdrinier paper machines. The mill's one cylinder-board machine was modified several years ago to produce specialty products and is not scheduled for any major upgrade.

The proposed capital program will increase the mill's total market pulp and board capacity by 40%, or 240,000 tpy, to 812,000 tpy. Construction could start in early 1993 and be completed by the third quarter of 1996.

assuming all environmental permits required for the expansion are granted. The company said it plans to issue \$250 million in new long-term debt to finance the upgrade, with the balance of the money coming from internal cash flow. Capital spending for Temple-Inland reached \$378 million in 1991. Most of the recent capital spending has been directed toward the company's Inland Container Corp. unit, which is completing construction of a new recycled linerboard mill in Kentucky.

The Evadale mill produces about 475,000 tpy of bleached board and 100,000 tpy of market pulp. Approximately 250,000 tons of the bleached board output goes into food service end uses, and the major product lines are paper cups and plates. ■

SALES AND EARNINGS

Canadian industry shows signs of life

After more than three years of steady deterioration, profitability in the Canadian forest products industry showed signs of changing course in second-quarter 1992, thanks to strength in the wood products sector, a weakening in the Canadian dollar, low interest rates, benefits from cost reduction efforts, and an upward trend in market pulp prices. Even so, the industry continued to lose money as pricing for paper grades, particularly newsprint, remained depressed. In addition, West Coast producers were hurt (although most only modestly) by an industry-wide labor strike in British Columbia that was subsequently settled in mid-July.

For the three months ending June 30, 1992, a *Pulp & Paper Week* survey of 17 companies showed a net loss of C\$206 million, excluding net nonrecurring charges of C\$19 million. In comparison, the same 17 companies lost C\$218 million in the year-ago period and C\$277 million in the first three months of 1992. The modest narrowing of the deficit, relative to the second quarter of 1991, marks the first year-to-year improvement in profits since as far back as the fourth quarter of 1988. Sales, meanwhile, rose to \$4.6 billion for the three months ending June 30, 1992, up 1.5% year to year and 7.8% higher than in first-quarter 1992.

Neither of the British Columbia giants, Fletcher Challenge Canada Ltd. or MacMillan Bloedel Ltd., was able to stem the flow of red ink. Both companies reported that the British Columbia industry-wide strike, which curtailed operations in the second half of June, had no significant impact on financial results. Fletcher Challenge added that increased customer orders in preparation for the strike caused operating rates and sales volume to improve.

Thanks to their orientation to wood products, Weldwood of Canada Ltd., West Fraser Timber Co. Ltd., and Slocan Forest Products Ltd. were among the handful of Canadian forest products companies that managed to post profits in second-quarter 1992. Yet, despite signs that cost-cutting efforts are helping to moderate losses, depressed paper prices, especially for newsprint, continued to undermine profitability of the eastern Canadian producers.

Abitibi-Price Inc. reported a loss of C\$41.3-million as "pricing for newsprint, uncoated groundwood, and coated papers continued to reflect excess industry capacity in North America." Abitibi's bottom line is expected to remain under considerable pressure for at least the next few months given that the 5% reduction in newsprint discounts, proposed for Aug. 1, is now expected to have relatively little impact on realizations during the third quarter.

Canadian Pacific Forest Products Ltd. reported a C\$59.5-million net loss, modestly worse than in the year-ago period, as the company continued to suffer from low pricing in its major product lines—newsprint, market pulp, and white papers. On the plus side, the company cited lower production costs and benefits from a weaker Canadian dollar, which averaged about US3¢ lower compared with last year, and noted its bottom line had significantly improved relative to the C\$71.1-million deficit posted in first-quarter 1992.

Although still posting sizable net deficits, Domtar Inc. reported that quarterly operating profits, excluding nonrecurring items, improved by C\$16 million year to year as higher shipments (primarily out of the Windsor mill) reduced overhead costs, and an estimated C\$15-million favorable impact from the weaker Canadian dollar was partially offset by lower prices for its main products.

Canadian paper industry results.

Companies	Second-quarter 1992 (C\$000)			
	Sales 1992	% change 1992/91	Earnings 1992	Earnings 1991
Abitibi-Price Inc.	\$691,900	-5.2%	(\$41,300)	(\$5,700)
CP Forest Products Ltd. ¹	462,200	-8.0	(59,500)	(57,500)
Canfor Corp.	272,900	27.5	(9,100)	(15,700)
Cascades Inc. ¹	212,356	4.1	6,920	6,687
Crestbrook Forest Industries Ltd.	38,197	-9.5	(3,288)	(3,351)
Doman Inc.	136,830	-3.9	(3,323)	(10,379)
Domtar Inc. ¹	484,000	3.4	(27,000)	(37,000)
Fletcher Challenge Canada Ltd.	225,900	-16.2	(20,100)	(16,500)
MacMillan Bloedel Ltd.	775,500	6.5	(7,100)	(11,300)
Noranda Forest Inc. ¹	1,148,000	5.8	(14,000)	(42,000)
Perkins Papers Ltd.	19,928	9.3	(2,032)	443
Repap Enterprises Corp.	288,200	1.5	(35,800)	(34,600)
Scott Paper Ltd.	97,941	-6.8	274	3,213
Slocan Forest Products Ltd.	61,300	9.5	2,359	(133)
Tembec Inc. ¹	99,913	53.2	(4,304)	139
Weldwood of Canada Ltd.	180,300	-6.9	4,500	100
West Fraser Timber Co. Ltd.	179,900	18.8	2,900	(34)
Totals²	\$4,599,665	1.5%	(\$206,344)	(\$217,965)

1. Exclude some major gains or losses.
2. Noranda Forest, which has a roughly 50% stake in MacMillan Bloedel, accounts for MB as a consolidated affiliate. Accordingly, to avoid double counting, MB's sales and half of its earnings are excluded from the totals line.
() = losses.

Spruce Falls Inc., the former Kimberly-Clark Corp. newsprint mill that was purchased last year by employees, community residents, and Tembec Inc., showed a modest profit for the three months ended June 30, 1992. The company reported consolidated net income of C\$1.1 million on net sales of C\$29.2 million. For the first six months of the year, the company has reported earnings of approximately C\$2 million on net sales of C\$64.7 million.

Gloomy forecast. Two major reports on the outlook for the Canadian forest products industry (both released in August) presented a gloomy forecast of massive shutdowns and layoffs and the need for up to an estimated C\$35 billion in modernizations and expansions to aid the ailing industry's adjustment to vastly changing economic circumstances. Included in the recommendations made by the industry in one of the reports are calls for a change in national monetary policies, investor tax incentives, cheaper electricity, and the discouragement of federal recycling legislation in Canada.

The Forest Sector Advisory Council warned that the Canadian forest products industry will see mill clo-

sures, company mergers, and the elimination of 25,000 jobs before the end of the decade. A "Strategy for Growth" report suggests that the federal government adapt its monetary policy by ensuring that Canadian interest rates remain within one percentage point of U.S. levels to reduce the volatility of Canadian-U.S. exports, the most critical factor in the industry's performance.

• Gaylord Container Corp., based in Deerfield, Ill., reported a net loss of \$32.9 million on sales of \$190 million for its third quarter of fiscal 1992 ended June 30. The company reported a year-ago net loss for the same period of \$125.5 million on sales of \$171 million. Results for last year's third quarter included a \$125.2-million charge against operating earnings from a write-down of assets at the Antioch, Calif., East mill, which was idled in February of 1991.

• St. Joe Paper Co. reported net income of \$3.2 million on sales of \$143.6 million for the second quarter ended June 30. The company reported net income of \$6.3 million on sales of \$144.3 million for the same period a year ago. ■

U.S. Paper Industry's Trade Balance Remains Tipped in Favor of Exports

Despite a slight decline, exports continue to outpace imports by as much as seven times, with the Pacific Rim consuming the majority

By KELLY H. FERGUSON, Deputy Editor

The economic recession that hit the U.S. in 1990 caused a slight drop in 1991 forest product exports and a substantial decrease in imports. Based on U.S. Census Bureau import/export data, shipments of all forest products from the U.S. totaled almost 37 million tons in 1991 and had a dollar value of about \$11.5 billion. This constitutes a 2% decline from the 1990 level of more than 37.5 million tons (Table 1).

Imports of forest products, however, declined 12% in the same period—from 5.8 million tons in 1990 to 5.1 million tons in 1991 (Table 2). This drop in imports may have resulted from a decline in consumption of paper and paperboard by U.S. consumers, since the U.S. has traditionally been a large importer of paper and board.

The import and export information for this survey was compiled by Trade Inc., a company specializing in trade data compilation, and analyzed by *Pulp & Paper*. The survey incorporates all forest products shipments through seaports in the U.S. and its territories for 1990 and 1991. Due to the method in which the U.S. Census Bureau labels shipments, individual grade-by-grade analysis was not possible. A general evaluation can be made though, based on knowledge of ports and the major shipments moving through them. Shipments were divided into five major categories:

- Paper and paperboard, cut to size or shape
- Paper and paperboard (general)
- Pulp and wastepaper
- Wood in the rough or roughly squared
- Wood, simply worked, and railway sleepers of wood.

TRADE BALANCE? Despite a much-publicized U.S. trade imbalance, the pulp and paper industry is a shining star in taking its products overseas. The U.S. exports more than seven times the tonnage of forest products it imports (Figure 1 illustrates this dramatic ratio). Based on those 1991 tonnages, the dollar value of exports is more than three times that of imports.

In terms of tonnage, "wood in the rough" (probably chips, logs, etc.) made up the largest single category in

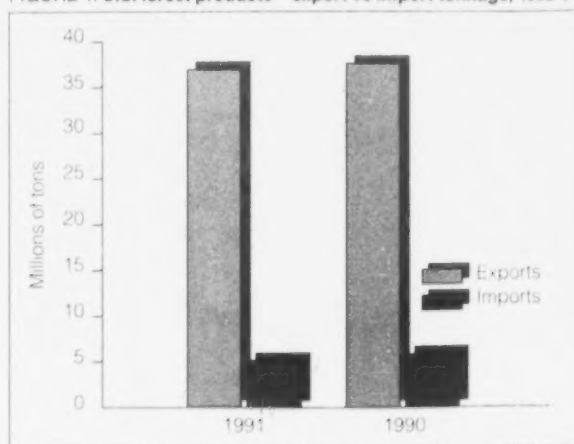
1991 at 15.5 million tons. This is followed by "pulp and wastepaper" (10.8 million tons); "paper and paperboard" (5.9 million tons); "wood, simply worked" (4.2 million tons); and "paper and paperboard, cut to size" (328,000 tons).

The dollar value for these same shipments, though, makes "paper and paperboard" (\$3.8 billion) the biggest money-making export in the forest products categories. The combined wood categories make up more than \$3.8 billion, followed closely by "pulp and wastepaper" at \$3.2 billion, and then "paper and paperboard, cut to size" at \$623 million.

On the import side, most of the 1991 tonnage, as well as the dollar value, falls into the "paper and paperboard" category (2.9 million tons at more than \$2 billion dollars). "Wood, simply worked" was the next largest import category at more than 1 million tons. The U.S. also imported almost 1 million tons of "pulp and wastepaper," which means mostly market pulp, since the U.S. imports very little wastepaper.

WHO GETS IT? WHO GIVES IT? From Algeria to Zimbabwe, countries around the world receive pulp, paper, and raw wood from the U.S. Japan is, by far, the largest

FIGURE 1: U.S. forest products—export vs import tonnage, 1990-91.



importer of forest products from the U.S., receiving almost 40% (14.7 million tons) of total U.S. exports. Although exact numbers are difficult to analyze due to the classification differences between the paper industry and the Census Bureau, much of that tonnage was in the raw wood categories.

Other Pacific Rim countries are also major importers of U.S. forest products. Korea, although a distant second to Japan, imported almost 5 million tons in 1991, followed by Mainland China (2.5 million tons) and Taiwan (2.2 million tons). European countries also import a large amount from the U.S., with Italy (1.4 million tons), the Federal Republic of Germany (997,000 tons), and the United Kingdom (833,272 tons) leading the way.

While not as extensive as the importer "who's who" list, shipments of forest products into the U.S. also come from all over the world. Canada is the largest exporter with 2.6 million tons, making up almost 55% of the total U.S. imports for 1991. Most of that tonnage was in "paper and paperboard" most likely as newsprint being shipped to the various large metropolitan areas. Canada

also exported a fairly large amount of wood into the U.S.

Brazil follows Canada as a major supplier of forest products to the U.S. In 1991, Brazil shipped 572,000 tons of forest products to the U.S., the majority of which was pulp. Finland, at 450,000 tons, was the third largest exporter (mostly paper and paperboard), followed by the Federal Republic of Germany (159,000 tons) and Sweden (153,000 tons).

KEEPING PORTS BUSY. Despite the slight decline in shipments from 1990 to 1991, the pulp and paper industry continues to keep U.S. seaports busy with large numbers of shipments. *The Pulp & Paper Forecaster* predicts that both exports and imports will continue to increase, at least through 1994, as U.S. paper companies expand their global presence through overseas marketing efforts, joint ventures, and investments in foreign mills.

According to the 1991 import/export survey by *Pulp & Paper*, many U.S. seaports have already begun to expand their facilities and are aggressively seeking forest products business. The data for this article listed more

TABLE 1: Forest products exports, 1990-91.

Port	1991		1990		% change, 1990 vs 1991 tonnage
	Tonnage	Value (\$000)	Tonnage	Value (\$000)	
Longview, Wash.	3,338,034	603,452	3,171,260	537,666	5%
Tacoma, Wash.	3,076,528	1,466,828	3,536,665	1,679,651	-13%
Aberdeen-Hoquiam, Wash.	2,298,815	271,296	2,329,537	271,785	-1%
New York, N.Y.	1,700,186	508,806	1,764,760	469,837	-4%
Seattle, Wash.	1,683,220	773,889	1,795,779	896,480	-6%
Mobile, Ala.	1,671,306	617,916	1,416,623	600,821	18%
Charleston, S.C.	1,553,233	744,393	1,355,226	697,738	15%
Ketchikan, Alaska	1,524,355	286,268	1,823,033	372,862	-16%
Savannah, Ga.	1,508,624	673,725	1,212,430	592,098	24%
Everett, Wash.	1,419,576	156,935	1,942,080	213,188	-27%
Portland, Ore.	1,297,952	421,182	1,610,709	472,171	-19%
Coos Bay, Ore.	1,287,735	327,893	1,623,630	388,170	-21%
Long Beach, Calif.	1,065,591	267,474	644,648	167,165	65%
Los Angeles, Calif.	1,015,296	275,863	1,166,046	360,430	-13%
Port Angeles, Wash.	984,651	103,242	1,406,819	146,734	-30%
Norfolk, Va.	932,046	477,026	886,637	439,761	5%
Oakland, Calif.	802,246	213,712	817,137	192,059	-2%
New Orleans, La.	739,109	361,140	615,733	310,502	20%
Wilmington, N.C.	609,041	244,286	604,482	287,879	1%
Olympia, Wash.	562,529	61,538	328,788	42,100	71%
Panama City, Fla.	498,337	181,856	457,370	192,880	9%
Eureka, Calif.	451,679	166,117	440,675	206,096	2%
Baton Rouge, La.	441,827	155,446	411,660	158,133	7%
Brunswick, Ga.	421,844	225,309	440,851	283,688	-4%
Astoria, Ore.	407,949	38,047	639,534	51,684	-36%
Baltimore, Md.	406,886	200,028	354,468	162,054	15%
Anacortes, Wash.	385,177	35,334	362,052	37,877	6%
Anchorage, Alaska	322,274	49,043	278,671	43,203	16%
Pascagoula, Miss.	287,082	109,938	202,015	86,463	42%
Jacksonville, Fla.	264,349	134,843	224,681	125,909	18%
Total — top 30 ports	32,957,477	10,152,825	33,863,999	10,487,084	-3%
Top 30 — % of total shipments	89%	88%	90%	89%	
Total — all ports	36,930,717	11,512,175	37,570,550	11,785,469	-2%

TABLE 2: Forest products imports, 1990-91.

Port	1991		1990		% change, 1990 vs 1991 tonnage
	Tonnage	Value (\$000)	Tonnage	Value (\$000)	
Long Beach, Calif.	576,851	397,602	555,207	390,306	4%
Seattle, Wash.	483,146	299,261	557,897	342,479	-13%
New York, N.Y.	462,918	382,245	423,877	403,824	9%
Philadelphia, Pa.	399,287	267,700	514,043	356,800	-22%
Baltimore, Md.	298,367	145,927	226,137	137,678	32%
Superior, Wis.	218,448	110,478	193,672	108,924	13%
Savannah, Ga.	217,096	104,021	231,783	116,751	-6%
Port Canaveral, Fla.	183,656	91,486	123,947	50,551	48%
San Juan, P.R.	178,771	87,395	189,649	93,478	-6%
Charleston, S.C.	163,810	146,859	251,290	213,404	-35%
Houston, Texas	163,792	115,586	242,797	153,636	-33%
Mobile, Ala.	163,604	76,049	147,838	79,932	11%
Los Angeles, Calif.	160,651	232,995	297,469	273,822	-46%
Chester, Pa.	146,523	69,921	209,260	115,424	-30%
Alexandria, Va.	139,451	73,492	151,668	79,260	-8%
San Francisco, Calif.	135,259	99,074	163,686	83,065	-17%
Norfolk, Va.	126,878	145,644	182,880	177,416	-31%
Port Everglades, Fla.	77,821	73,012	152,758	105,879	-49%
New Orleans, La.	67,193	41,706	74,968	50,287	-10%
Oakland, Calif.	62,077	68,580	61,733	64,179	1%
Wilmington, Del.	58,149	17,818	35,949	10,166	62%
Miami, Fla.	55,959	45,356	82,516	57,707	-32%
Jacksonville, Fla.	48,240	23,937	50,883	21,986	-5%
Portland, Maine	44,250	25,183	49,957	31,488	-11%
Tampa, Fla.	38,982	14,659	66,575	17,350	-41%
San Diego, Calif.	38,854	19,577	58,873	29,444	-34%
New London, Conn.	36,168	12,592	57,820	23,454	-37%
Camden, N.J.	33,688	13,023	26,367	11,527	28%
Port Hueneme, Calif.	29,446	11,469	38,932	22,000	-24%
Gulfport, Miss.	26,230	15,318	21,902	10,832	20%
Total — top 30 ports	4,835,565	3,227,965	5,442,333	3,633,049	-11%
<i>Top 30 — % of total shipments</i>	<i>95%</i>	<i>92%</i>	<i>93%</i>	<i>90%</i>	
Total — all ports	5,114,835	3,526,183	5,843,163	4,020,670	-12%

than 130 seaports that handled forest products in 1990 and 1991.

Tables 1 and 2 list the top 30 U.S. ports for both exports and imports. The tables show that these ports handled 89% of total 1991 export tonnage and 95% of total 1991 import tonnage.

In export tonnage, the northwestern ports, especially those in Washington State, clearly dominate. While this is due to the cluster of pulp, paper, and log and lumber operations in that area, the tonnages moving through these ports could diminish as limits are applied to the logging operations in that region. Many of these ports, with the notable exception of Olympia, Wash., have already experienced declines from 1990 to 1991.

Conversely, most of the ports in the South and Southeast made gains in the same period. For example, many of the Gulf Coast ports—Mobile, Ala.; New Orleans, La.; and Pascagoula, Miss.—experienced significant increases in export shipments.

Ports located near major metropolitan areas—Los Angeles, Calif.; New York, N.Y.; Philadelphia, Pa.; etc.—are

the beneficiaries of forest products imports; again, mostly paper and paperboard. However, in keeping with the decline in total import tonnages, many of the top 30 ports experienced large decreases in tonnage handled. ■

Survey changes

This is the third pulp and paper import/export survey done by *Pulp & Paper*. Unlike the surveys of the last two years, which were based on direct surveys of the ports, this article is based on total import and export data from the U.S. Bureau of the Census and compiled by John Sexton of Trade Inc. (146 N. Canal St., Seattle, Wash. 98103). This change was made to provide more thorough data on shipments through seaports. However, because of time constraints, Canadian ports could not be included. *P&P* hopes to include Canadian port information, as well as better grade breakdowns, in the 1993 report.

China Becoming Major Market with New "Open Door" Policy, Large Population

Need to reduce environmental problems and expand its industrial base drives mills in the People's Republic of China to invest in modern technology

By M. AL-SIMAANI, R. BERARD, P. MASSICOTTE, and P. SHARMAN

With one quarter of the world's population and a new "open door" policy, the People's Republic of China (PRC) is rapidly becoming the largest expanding market for the pulp and paper industry. As the birthplace of paper, the PRC has a long history of papermaking. However, increasing modernization and needs for education and communication have created a demand that has far outgrown China's current paper production capabilities.

New technology and huge investments will be necessary to replace the small paper mills that currently contribute to China's paper supply, and in turn, to its enormous environmental problems. The Canadian industry has played, and will continue to play, a leading role in the supply of equipment and technology to meet that growth and the challenge of producing high-quality pulp—efficiently and with minimal environmental impact—from a variety of raw materials.

CURRENT SITUATION. The PRC ranks fourth in the world among paper and paperboard producing countries, with 13.3 million tons in 1989. However, paper consumption per capita is only 11.6 kg, compared with the world average of 44 kg per capita.

More than 500 grades of pulp, paper, and board are being produced (in an estimated 5,000 paper mills and 9,000 pulp mills scattered around the country) to meet the basic demands of growing industries, education, agriculture, national defense, and other special needs. In addition, more than 850,000 tons of linerboard, kraft wrapping grades, newsprint, and printing and writing papers are imported to supplement the local production.

The PRC also ranks sixth in the world among pulp producing countries, with 9.3 million tons in 1989, mainly from nonwood plant fibers (7.8 million tons). The utilization of various agricultural residues and non-

TABLE 1: Pulp production in the People's Republic of China (1990).

	Total world production in 1,000 metric tpy	China's production capacity in 1,000 metric tpy	% of world total
Rice and cereal straw pulps	6,785	5,831	86
Bagasse pulp	2,740	391	14
Bamboo pulp	987	166	17

wood plants constitute the major source of fiber for pulp production.

According to a survey by the Food & Agriculture Organization of the United Nations (FAO), China is the world's leader in the utilization of rice and wheat straw for the production of pulp, making 86% of the world's total straw pulp in 1990. The same survey shows that China ranks second after India in the production of bagasse pulp and bamboo pulp.

Table 1 shows China's pulp production of major nonwood fiber pulps in 1990. Because of the scarcity of pulpwood in China, its production—at 1.5 million tons—represents only 16% of the total pulp production of 9.3 million tons.

Secondary fiber's contribution to the paper and board industry has increased steadily. Wastepaper consumption exceeded 3.3 million tons in 1989, most of which was imported.

FIBROUS RAW MATERIAL. Wood. The use of nonwood plant materials for pulp production in the PRC is not a matter of choice but of necessity. Forest resources in China are limited. Its total forest area of approximately 119 million hectares covers only 12% of the total land area and represents 0.12 hectares per capita, compared with the world average of 1.1 hectares per capita. Plant-ed forests account for about one quarter of the total forested area, the remainder being natural forest.

Most of the natural forest area is located in the north-east provinces of Heilongjiang, Nei-mongol, and Jilin. It

Mr. Al-Simaani is senior process engineer, Mr. Berard is project manager, and Mr. Massicotte is project engineer, NLK Consultants Inc. Mr. Sharman is president, NLK International.

FIGURE 1: Raw material locations.



consists of mixed coniferous stands such as pine, Chinese fir, spruce, and larch, and broad leaf species such as birch, aspen, and Mongolian oak. The southwestern provinces of Yunnan, Sichuan, and Xizang contain the second largest standing wood volume (Figure 1).

Due to the industry's shortage of woodfiber, the PRC government is undertaking an ambitious national reforestation program to expand China's forest area by assisting state and collective farms to establish managed forest stands. This plan, once realized, will increase the forest area to 20% of the total land area by the year 2000.

Straw and bagasse. Even with the expansion of the national forest, nonwood material will still constitute the major source of fiber for pulp production, despite the problems associated with its utilization. Agricultural residue is bulky to handle, collect, and transport. It is produced at fairly small scattered areas all over the country, with seasonal variations and a sharp peak in the late summer weeks. It has a tendency to deteriorate during storage if no special precautions are taken. These materials usually have short fibers and are rich in silica. This presents special technical problems in the chemical recovery process.

On the other hand, grasses have the advantage of a

chemical composition similar to hardwood, i.e., comparatively rich in carbohydrates and fairly low in content of an easily accessible lignin. This makes them easy to pulp and to bleach.

Although straw and bagasse produce short-fiber pulps with low tear strength, they are being used for good-quality printing, writing, and tissue papers at high percentages in the furnish. Other grades that require strength, such as linerboard, utilize these pulps blended with a higher percentage of long-fiber pulps.

Bamboo. Bamboo grows in the southern and western provinces of the country including Hunan, Sichuan, Fujian and Jiangsu (Figure 1). Bamboo forests cover an area of approximately 3.3 million hectares. Its lignin content is the highest among nonwood raw materials. However, it contains medium and long fibers, matching those of softwood pulps. Because of the high tear strength of bamboo pulp, it has a great potential for various blends of paper products. See Table 2 for some basic fiber properties of these various species.

MILL SIZES, NEW MILL CONFIGURATION. Pulp mills in China are classified into three categories according to production capacity:

- Small-size mills with a capacity of less than 10,000 tpy
- Medium-size mills with a capacity of 10,000 to 30,000 tpy
- Large-size mills with a capacity of more than 30,000 tpy.

Approximately 200 of the pulp mills are medium- and large-size and account for 42% of total pulp production. The remaining 58% is produced in a staggering number of small mills. It is therefore fair to say that these small mills have been a major contributor to the Chinese pulp and paper industry despite drawbacks, such as low operating efficiency and environmental pollution, due to lack of chemical recovery, in most small mills. Of the three main pulping processes (mechanical, semichemical, chemical), the majority of the mills employ the chemical process. With the exception of a few mills using the sulfite process, the dominant chemical process is alkaline (soda and kraft).

The main contributing factors to the presence of small mills include the following:

- Proximity to raw material resources reduces the cost of handling and transportation. Nonwood raw materials are bulky and scattered throughout remote areas.
- Normally, small mills serve local market needs within the province, thereby reducing the cost of final

TABLE 2: Raw material fiber properties.

Wood	Fiber length range (mm)	Average fiber dia (microns)
Temperate zone coniferous wood	2.7 to 4.6	38
Temperate zone hardwoods	0.7 to 1.6	26
Nonwood		
Bamboo	2.7 to 4.0	14
Bagasse	1.0 to 1.5	20
Rice straw	0.8 to 1.0	9
Wheat straw	1.0 to 1.5	15

product distribution since the state of the infrastructure, such as roads and rail, is problematic.

- Capital available for investment by provincial and municipal authorities and bank loans from within the country or from abroad are limited.

- Labor costs are low.

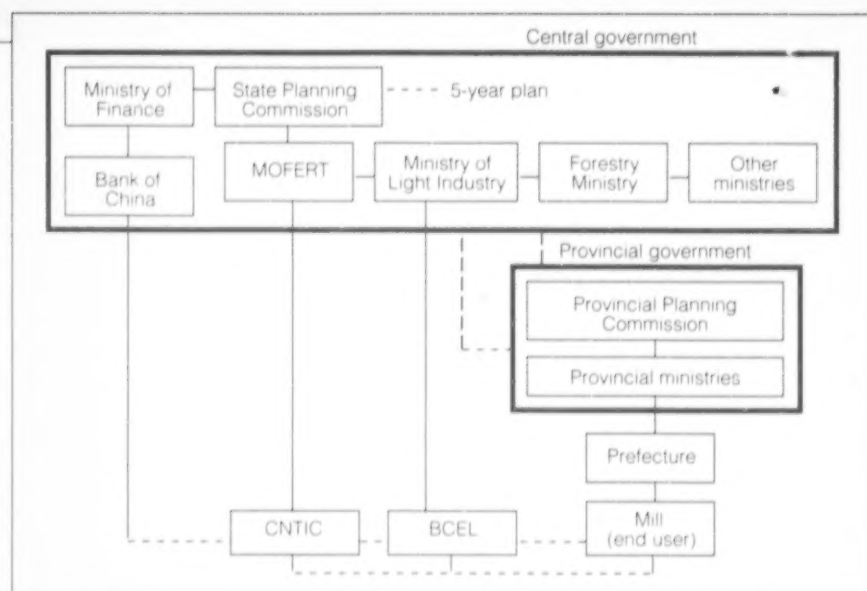
Today, almost all mills in the planning stage or under construction fall in the large-size mill category. The Ya'an pulp and paper mill (startup in 1994) in Sichuan Province is a typical example. The mill is designed to

Continues on page 74

Mill/ province	Raw material	End product/ capacity	Major international supplier
Ya'an/ Sichuan Province	Bamboo, Masson pine	Bleached kraft, P & W/ 55,000 tpy	Canadian Industrial Consortium (CIC)
Shaowu/ Fujian Province	Bamboo	Bleached kraft, P & W/ 50,000 tpy	Canadian Industrial Consortium (CIC)
Guangning/ Guangdong Province	Bamboo	Market bleached kraft/ 44,000 tpy	Beloit
Hanyang/ Hubei Province	Italian poplar	CTMP/ 35,000 tpy	Hymac
Guangzhou/ Guangdong Province	Masson pine	CTMP/ 50,000 tpy	Hymac
Dongguan/ Guangdong Province	Purchased pulp	Coated paper/ 29,000 tpy	Relocated major equipment from U.S.A.
Yalujiang/ Liaoning Province	Poplar	CTMP/ 46,000 tpy	Andritz Sprout-Bauer
Yue Yang/ Hunan Province	Masson pine	CTMP/ 26,000 tpy	Andritz Sprout-Bauer
Yangzhou/ Jiangsu Province	Secondary fiber	Coated board/ 42,000 tpy	Voith
Qingzhou/ Fujian Province	Pine	Unbleached kraft/ 150,000 tpy	Voith, ABB, Flakt, Sunds, Kamyr, Ahlstrom, Rauma-Repola
Xing Huo/ Jiangsu Province	Purchased pulp, secondary fiber	Coated boxboard/ 120,000 tpy	Valmet-Tampella, Sunds
Yantai/ Shandong Province	Purchased pulp	Boxboard/ 120,000 tpy	Valmet-Tampella
Yibin/ Sichuan Province	Bamboo	Kraft/ 42,000 tpy	Kamyr
Leshan/ Sichuan Province	Pine	Market bleached kraft, P & W/80,000 tpy	Relocated major equipment from Austria
Jiangmen/ Guangdong Province	Secondary fiber	Coated paper/ 50,000 tpy	Aikawa-Lamort, Black Clawson
Hexian/ Guangxi Province	Masson pine	Market bleached kraft/ 60,000 tpy	Sunds, Rauma-Repola, Ahlstrom

TABLE 3: Selected current projects in the People's Republic of China.

FIGURE 2: Government structure in the People's Republic of China.



produce 55,000 tpy of fully bleached kraft pulp for offset paper and market pulp from bamboo and masson pine.

Foreign equipment is being supplied by the Canadian Industrial Consortium Inc. (CIC) and includes major equipment for effluent treatment, raw material preparation, pulping, stock preparation, and evaporation. The design of the mill incorporates state-of-the-art technologies of oxygen delignification, three-stage bleaching (CDEOD), chemical preparation, and a chemical recovery system.

Equipment built and supplied from domestic manufacturing facilities in the PRC will include effluent treatment, raw material preparation, digesters, recovery boiler and power boiler, recausticizing system, pulp drying machine, and the paper machine. Table 3 outlines several current projects. Table 4 outlines proposed projects for the short term.

To minimize the impact of mill effluent on receiving waters, downstream users, land use, and related wildlife—specifically endangered species such as the Panda bear—the effluent treatment system for the Ya'an mill includes primary treatment to remove suspended solids and secondary treatment in an air-activated sludge system, followed by secondary clarifiers to ensure that discharged effluent will meet the following local and provincial guidelines:

- Biological oxygen demand (BOD)—100 mg/l
- Chemical oxygen demand (COD)—350 mg/l
- Suspended solids—200 ppm.

TECHNICAL/MANUFACTURING CAPABILITIES. Technical. Since the founding of the People's Republic of China in 1949, the pulp and paper industry has made significant increases in paper and board production (from 108,000 tons in 1949 to 13.3 million tons in 1990), as well as advances in process machinery and nonwood fiber processing technology. This was attained mainly through the devotion and hard work of the nation's scientists, researchers, engineers, chemists, and workers.

The Paper Industry Research Institute of China (PIRIC) was established in 1965 in Beijing to serve the pulp and paper industry. PIRIC serves as the national research center of China's pulp and paper industry under the direct supervision of the Ministry of Light Industry to carry out laboratory R&D in the fields of pulping, papermaking, coating, and environmental protection technologies.

TABLE 4: Selected proposed projects in the People's Republic of China.

Mill/ province	Raw material	End product/ capacity
Lonyang/ Fujian Province	Mawei pine	BCTMP/ 35,000 tpy
Mudanjiang/ Heilongjiang Province	Pine, poplar, birch, larch	Kraft/ 100,000 tpy CTMP/ 70,000 tpy
Daxinganling/ Heilongjiang Province	Birch, larch	Sack paper/ 50,000 tpy
Leizhou/ Guangdong Province	Eucalyptus	Bleached kraft/ 50,000 tpy
Yakeshi/ Nei-Mongol Province	Birch, larch	BCTMP/ 150,000 tpy
Shanwei/ Guangdong Province	Wood	Kraft/ 150,000 tpy
Shandong Yellow Sea/ Shandong Province	Pine, hardwood	Bleached kraft/ 160,000 tpy
Lijiang Peninsula/ Shanghai County	Pine	Kraft/ 100,000 tpy CTMP/ 200,000 tpy
Tianjin #4/ Tianjin Province	Purchased and domestic bleached kraft pulp	Coated paper/ 40,000 tpy
Yunnan Simao/ Yunnan Province	Pine	Bleached kraft/ 50,000 tpy
Zhejiang Consortium/ Zhejiang Province	Unknown	Coated board/ 34,000 tpy
Nanning/ Guangxi Province	Masson pine	Market bleached kraft/ 102,000 tpy

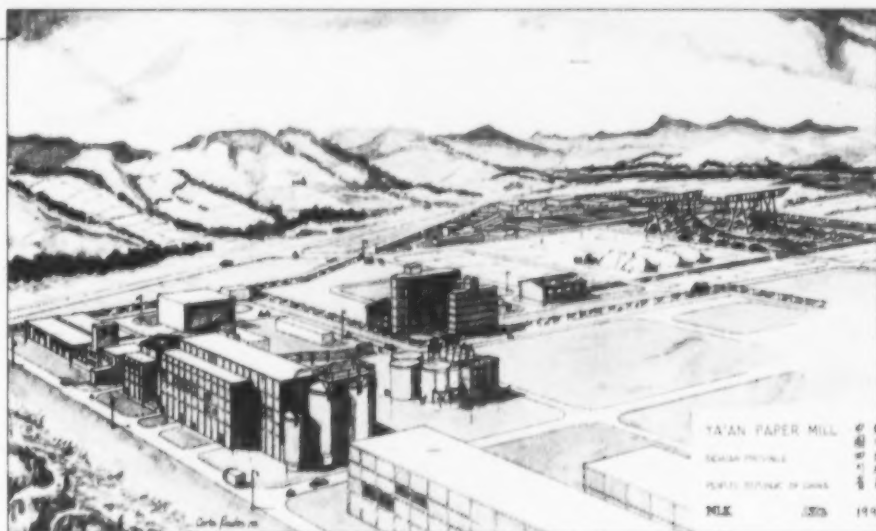


FIGURE 3: Artist's rendering of the Ya'an Paper Mill, which is jointly funded by the People's Construction Bank of China, the Sichuan government, and the Canadian government.

PIRIC acts also as a national center for standardization and quality control for the pulp and paper industry. Overseas institutes such as the Pulp & Paper Research Institute of Canada (PAPRICAN) have been instrumental in assisting with this program.

Manufacturing. As for local supply capabilities, the Chinese-supplied equipment is mostly oriented toward small-size plants. The PRC pulp and paper equipment manufacturing plants have produced equipment of good quality. However, the main problems facing manufacturing facilities are the lack of technology needed to manufacture state-of-the-art equipment, and the unavailability of the special metallurgy required to manufacture process equipment able to withstand the corrosive conditions of modern pulping and bleaching.

Therefore, many joint ventures have been set up to provide this new technology, along with technology transfer. The following are examples of equipment manufacturing facilities in the PRC:

- Fourdrinier paper machines, cylinder board machines, calenders, pulp washers, pressure screens, refiners, heaters, etc., produced in Shanghai
- Paper machines in Xian (joint venture with Valmet)
- Pulping equipment in Tianjin (joint venture with Sunds to produce horizontal continuous digesters)
- Board machine in Liaoyang (joint venture with Voith)
- High-intensity rubber rolls in Xian (joint venture with Beloit)
- Centrifugal pumps for the chemical and petrochemical industries in Dalian
- Many joint ventures in various locations for manufacturers of electrical equipment, instrumentation, and valves.

ORGANIZATION. Long-range planning is done by the Central Government as it draws out the five- and ten-year plans in conjunction with provincial and local governments. Potential projects are screened by the Ministry of Foreign Trade (MOFERT) to determine which projects might qualify for funding under agreements with foreign countries such as Canada or the World and

Asian Development Banks.

Once a project is selected, MOFERT assigns an agency such as China National Technical Import & Export Corp. (CNTIC) to work on its behalf and that of the end user to negotiate a contract with potential suppliers. Once the contract is signed, it must be ratified by each country's government before financing is put into place and the project is given the go-ahead.

Contracts being executed are led by the Ministry of Light Industry, which appoints a design institute such as the Beijing Consulting & Engineering Corp. for Light Industry (BCEL) to serve as the consultant to the end user and to interface with the supplier and its engineering arm. Figure 2 illustrates this government structure relative to the projects.

All of these contracts are set up to maximize technology transfer. The prepared technical documentation is reviewed in a series of design liaison meetings in order to study the preliminary and detail engineering. Most of these projects also incorporate some form of training, both hands-on and classroom.

The Ya'an Paper Mill is an example of such a project. The mill is jointly funded by the People's Construction Bank of China, the Sichuan Government, and Canadian Government financing of US\$35.5 million for the purchase of equipment from Canada. Project management and detail engineering is provided by BCEL. Construction management is by the end user.

Such contracts typically take 36 to 42 months to execute from the beginning of the project to plant commissioning and startup. However, many years of proposal, review, and negotiation may take place prior to the actual signing and ratification of the contract. This requires a considerable marketing effort that must be borne by the international suppliers.

OUTLOOK. The "open-door" policy adopted and encouraged recently by the Government of China is expected to reflect on the growth of the national economy, specifically the industrial sector. The pulp and paper industry will have to keep pace with the economic and so-

cial development. Certain products such as newsprint, linerboard, and printing papers will have to be given priority to fill the gap between supply and demand and to reduce imports.

For the industry to face the challenge of meeting a production target of 19 to 20 million tons of paper and board by the end of the century, many facets of the industry have to be addressed, for example:

- **Raw materials:** Organized planning to ensure continuous supply of raw materials to this growing industry.
- Wood: To be given first priority due to the shortage of long fiber and as a potential raw material for mechanical pulp. Massive forestation of selected species.
- Bamboo: More cultivated areas. This fiber has excellent potential.
- Bagasse: Increased utilization as a fiber source.
- Reed: Expansion of managed plantations.
- Capital investment from local and foreign sources.
- Implementation of necessary modifications to update existing mills to improve production efficiency and recovery of chemicals. Minimize mill effluent impact on environment and enhance product quality with special emphasis on quality control.
- Increased use of secondary fiber.
- Optimization of product furnish (i.e., maximize short fiber proportion while maintaining product quality).

• Further R&D to deal with problems specific to the Chinese pulp and paper industry.

• Increased product development from available local resources.

SUMMARY. Certainly, the PRC represents a major potential market for suppliers to the pulp and paper industry. This market has recently opened up to worldwide technology—instead of only to the traditional Scandinavian suppliers.

It will be a long time before mills in China are built the size normally seen in the Western world. However, all new mill designs have incorporated the most advanced technological innovations regardless of the size of the installation.

With the cost of imported pulps and waste soaring, the technology of nonwood pulping will continue to develop at a rapid rate. Wood resources will be limited for some time, certainly until forest management practices are improved. Also, as those in the PRC point out, nonwood species such as bamboo vary from province to province, requiring individual design consideration.

NLK expects the current surge in new mills to continue for several decades. Most recently, NLK has assisted with consulting engineering services for the Ya'an, Shaowu, Dougguan, and Guangning projects. ■

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